

CHALLENGES OF CLIMATE CHANGES AND DIGITAL TECHNOLOGIES DEVELOPMENT TO ART SUBJECT TEACHERS

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Abstract

The purpose of this article is to evaluate the impact of both climate change and digital aesthetics on art subject teachers and to discuss the prospects of curriculum. The article provides the reflection of human dependence on the effects of climate change as well as drastic development of musical technologies which are understood as a means of consolidating creative pedagogy. Theoretical considerations are illustrated by the results of empirical research, on the one hand, in value-based attitudes of primary school teachers, students of 9-12th classes to climate change and, on the other hand, case studies of digital music teaching in schools as well as the digital divide problem which still presents among Lithuanian teachers. Case study of secondary school has demonstrated that *the teacher can learn from their students if they work in synergy*; great results can be achieved when teachers work in partnership with the students. The impact of human activity on climate change seems more ominous for both the teachers and the students comparing it to other forms of threats. The creatively oriented curriculum appears to meet the needs of 21st century learners, offering opportunities for multitasking, problem solving, trial and error learning, logical thinking, and peer to peer learning.

KEYWORDS: climate change, education, art subject teachers, digital music curriculum, creative education.

Introduction

Modern knowledge society poses new challenges for school. On the one hand, the impact of climate changes after-effect is becoming more and more alarming, and on the other hand, the impact of digital technologies is constantly increasing. Such challenges to some extent enforce us to seek new aspects of educational process, which could help to prepare young generation for future life more successfully. It is also apparent that there are some changes in teacher/student interrelations. When discussing and performing pictures on climate changes as well as creating music by digital technologies atmosphere of partnership and mutual understanding to significant extent prevails in teacher/student relations.

In the course of history humans constantly observed certain effects of weather and climate changes. Most climate changes conditioned various natural disasters, which were followed by long periods of famine, epidemics, wars or even migration of the whole nations to other places of living. With the warming of the weather, the quantity of precipitation increases, which enlarges the number and scope of natural disasters. As the fatal effects of climate changes determine human world outlook, the search for new visions of world development is intensified in such moments as well as philosophical, religious and even artistic activeness of human soul. So one aspect of our discussion is the concept of artistic education connected with conceiving of various phenomena in the natural environment.

It is obvious also that nowadays students have adapted so much to new digital technologies and their learning needs and methods have significantly changed. There are several problematic areas which make integration of digital technologies more difficult. Firstly, it is digital divide problem between teacher and student. The teachers' digital competence, their self-confidence in this area is quite poor. Secondly, there are different attitudes towards computer user roles. Teachers understand digital technologies mostly as means of information search and demonstration, whereas students want to make their own work with computers. Thirdly, computer supply problems exist as yet (Green & Hannon, 2007) and they are still present in Lithuania.

The object of the research is to investigate theoretically and base empirically the peculiarities of educational process and possibilities of teachers and students partnership in the conditions of climate change and digital technologies development.

The aim of the research is to disclose new aspects of educational content which could bring the process of teaching/learning up-to-date in the conditions of climate change and digital divide between teachers and students.

The methods of scientific literature analysis, case study as well as educators and students questionnaire survey are applied in the research.

The objectives for raised aim are:

1. To determine the role of the attitude towards climate change as an overall phenomenon in the process of artistic education.
2. To identify the situation of the digital divide between teachers and students in music education.

The theoretical material is illustrated by the results of empirical research, obtained from the investigation of value-based attitudes of primary teachers of art and students of 9-12th classes towards aesthetic and environmental phenomena within the conditions of climate change. Some examples of good practice relating to the implementation of the Computer Music Technology General Curriculum in secondary school are presented in the article.

Reaction to climate changes as an overall phenomenon of nature

The vision of nature makes a significant impact on children's emotional development and the formation of various abilities. In order to develop a child's aesthetic taste, it is advisable to apply the aesthetic, cultural and recreational values of nature to the utmost. All citizens should take interest in environmental issues, whereas the school is the institution, which should direct its attention towards the younger generation as a potential power to influence the development of climate changes in the right direction. Carrying out the preventive education in climate changes, the students should be introduced to the work of non-governmental organizations, international and national projects, including those intended for schools, which are concerned with the discussed issues.

Students should be encouraged to search for new projects on the internet and take active participation in them, be able to observe and assess the changes in nature as well as look for the possibilities to clear the surrounding nature. Teacher-student interaction is achievable through the taught subject; therefore, the topic on the environmental issues could be discussed in all subjects as a constituent part of the course starting from the perception of the aesthetic values of nature and observance of its unique beauty to the search for the ways of stopping the process of nature destruction. This should be done in accordance with the students' free choice based on the insights of environmental self-awareness. Skaidrīte Gūtmane, a Latvian philosopher and educator, underlines: "Living in a modern secular and democratic state, one should not forget about the dimension of spiritual freedom" (Gūtmane, 2009, p. 40).

Lithuanian teachers and students of 9-12th classes conducted empirical research in the autumn of 2011, which revealed that teachers' (n=43) community was concerned with earlier studies of the effects of climate changes. It was determined that teachers express common concern about the unpredictable effects of climate changes on the surrounding environment: 74,4% of teachers assessed the formation of students' attitudes during the lesson in a highly positive way. Students (n=37) were less enthusiastic at this point: only 21,6 % responded in a highly positive way, 45,9% provided positive responses, whereas 32,4% expressed no opinion.

The outcomes of the distance between the modern society and nature are obvious. Recognition of nature is often encouraged by artificial means. For instance, teachers and students are frequently invited to cognize nature and its phenomena using the latest achievement in technology (interactive boards, television, cinema, glossy magazines, etc.), which usually lead to pollution rather than positive results. On the other hand, while caring for the global phenomena, the care for one's history, culture and environment is often neglected.

We are convinced that the effect of climate changes on human life should be explored more systematically covering all spheres of nature linked to all living beings if we want to achieve more positive results.

Despite that climate changes are currently perceived as a continuous process, the dynamism of the changes in recent times is too obvious and in some aspects even dangerous. This danger is expressed in all spheres where there is any relation with life existence. For example, the layer of air, which covers the globe, and its phenomena (clouds, winds, rain, thunder, snow, hail, fog, drizzle, etc.) undergo changes in *the atmosphere*.

Oceans, seas, atmospheric waters, rivers, lakes, marshes, underwater, ice (especially ice sheets) and snow suffer from changes in *the hydrosphere*, which was the first place of the appearance of life. Therefore, these changes are examined more and more closely.

Changes occur also in *the lithosphere*, or the solid part of the earth, whose thickness is 50-200 km. The bowels of the earth crust (granites, marbles, rocks and fossils) are exhausted due to the increased human demands for consumption. However, extracting earth resources human beings "dig under themselves" and refuse to think of the possible outcomes.

Substantial and sometimes dangerous changes occur in *the cryosphere*, a sphere of zero or lower temperature, which covers part of atmosphere, hydrosphere and lithosphere. These include mountain glaciers, ice covering of water bodies, glaciers, ice clouds, snow covering, frost as well as permanent and seasonal freezing of the earth. The melting of ice has received considerable discussion recently. It is

known that cryosphere also exists on Mars, which is also shifted due to climate changes; however, the active impact of human beings on the changes on this planet will be observed much later, say, after the settlement of the first colonists of the earth.

Finally, a lot of concern is connected with the changes in the *biosphere*. The totality of ecosystems, which includes all the three layers of the earth surface, is affected by climate changes in each of them. The soil, in which microorganisms survive up to 3 km deep, or water, where organisms can be found up to 11 km deep, or, finally, the air, where organisms can be traced in the height of 15 km (bacteria, plant spores)—everything is affected by climate changes. All the three layers of the biosphere consist of two kingdoms: the kingdom of crawling, walking, swimming and flying *fauna* and different species of lower (bacteria, algae, fungi and lichen) and higher (a body having a stem, leaves and roots, except moss) *flora*. In spite of innumerable varieties of species within each of these categories, their extinction, which among others is also conditioned by climate changes, becomes a subject of frequent discussion.

The teachers and students were asked to evaluate the threat of changes in all the five nature spheres within the range of five points, where 5 means that the sphere is most likely to be affected, and 1 stands for the sphere that is least likely to be affected. The conducted analysis of value-based attitudes of teachers and students revealed that the atmosphere will be affected by climate changes most of all. The possibility of the changes in this sphere received almost four points. Whereas, according to teachers and students, lithosphere (the solid part of the earth surface) will be affected by climate changes least of all. Having compared teachers' and students' answers, the teachers expressed larger concern about all the changes in all the five spheres rather than students. As far as value-based orientation towards the biosphere and cryosphere, the attitudes of teachers and students varied insignificantly; however, the teachers' concern was much bigger than students' in terms of the lithosphere, hydrosphere and especially atmosphere (see Fig. 1).

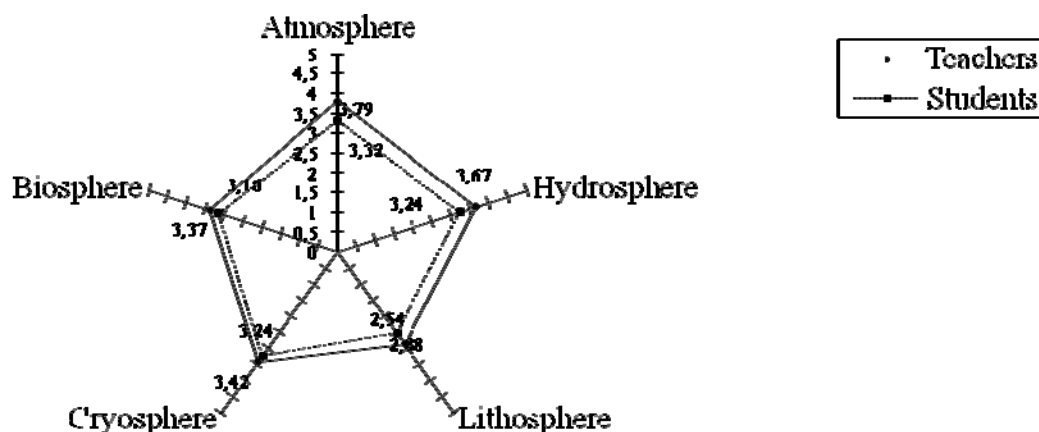


Fig. 1. Value-based orientation of teachers and students in terms of the negative impact of climate changes on the spheres of the natural environment

There are a lot of reasons of the change of climate, which in its turn influence all the alterations around us. First of all, this includes the impact of external phenomena, namely, astronomic causes (the intensity of solar and galaxy radiation, the form of the Earth's orbit, the bent of the Earth's axis towards the plane of the orbit, the speed of the Earth's twist around its axis) and geo-physical reasons (gravity and magnetic fields of the Earth, vulcanization and geothermal heat). The internal causes of climate shifts, such as the composition of atmospheric gases and the quantity of aerosols, land relief and surface structure, changes in atmosphere and water circulation, also influence climate changes. We have to conciliate and adapt to the external and internal causes, which in one or another way affect climate changes, as they keep to their own objectivity and are not subject to consider human wishes or their spare possibilities. On the other hand, a lot of phenomena affected by climate changes do not receive people's immediate fear, as major changes occur slowly. Their development lasts for hundreds or even thousands of years. For instance, melting of glaciers or snow on mountain peaks are not sensed directly in comparison to volcano eruptions, earthquakes or tsunamis; they are mostly perceived by reasoning.

The part of environment, which is affected by human activity, is perceived in a slightly different way. At the first sight, anthropogenic climate change seems insignificant in the context of its determinants; however, the results of this impact are threatening enough. In this respect, human beings become a kind of allies of those dangerous outcomes, which are caused by objective power of global climate changes. Human-caused threats of climate changes, which endanger the stable forms of life in the biosphere, are usually referred to as global warming and are related to the changes in greenhouse gas concentrations. The average mean of the students' assessment was below three points in terms of three causes: geo-physical causes were assessed by 2.81 points, internal climate alterations—by 2.86 points and astronomic causes—by 2.92 points. Meanwhile human-caused threats of climate changes were assessed by 3.73 points.

It is of interest that the average of neither the teachers' nor the students' evaluations regarding the spheres of the natural environment did not exceed four points of the possible five. This shows that the mass psychosis in terms of the negative impact of climate change has affected neither the youth nor the adults. On the other hand, the evaluation of nature spheres did not go beyond three points. The teachers noticed the least changes in the lithosphere (2.88 points), whereas the students' evaluation comprised 2.54 points.

In order to give rise to environmental interests, enhance environmental awareness and enrich environmental experience of the younger generation, the aesthetic experience of natural environment changes could be employed. Arnold Berleant is absolutely right when he claims: "Sensitivity, not just to the beauties but also to the offenses and injures to environment, is a precondition to recovering the fullness of the world." (1998, p. 3). The idea of the continuity of environment, which to a large extent manifests itself as its aesthetic fullness, sounds fairly convincingly.

Digital divide problem: when teachers work peer to peer and in partnership with the students

The study of the place of digital technologies in general schools includes data on the attitude of the teachers of art education towards the use of digital technologies and the needs of the teachers (Social Research Laboratory..., 2005). We will show how digital technologies were integrated into the general music curricula for primary and basic education (Education Development Centre, 2008) and present in more detail the Computer Music Technology Curriculum established for secondary education in 2007 (Ministry of Education..., 2007) and discuss the provision, the aims, objectives, and structure of the curriculum and expected achievable targets for students.

In 2005 the Social Research Laboratory of Kaunas University of Technology in Lithuania, commissioned by Microsoft agency in the Baltics, carried out a study entitled *The Development of ICT in Schools in Lithuania*. The objective of the study was to explore different aspects of the development of information technologies in general education schools. The study included teachers, students and school directors and 528 teachers from 62 schools of Lithuania, including 35 art and music teachers (6.6 % of all respondents). The data of the study proved an old truth—a good supply of electronic learning materials does not guarantee intensive use of IT; teachers' attitudes to digital technologies, their ability to use these materials and self-confidence are more important. In this study, teachers indicated that the greatest obstacle to using the computers was they fear of showing that their technology skills were poorer than those of students (28%) (Social Research Laboratory..., 2005, p. 35). A strong need for training in the use of digital technologies to support learning, especially in different subjects, was also suggested in teachers' answers.

When analyzing the data of the survey *The Development of digital technologies in schools of Lithuania*, it became evident that arts subjects were most poorly supplied: the answers *Poorly* and *Very poorly* were chosen by 66% of arts teachers (Social Research Laboratory..., 2005, p. 38). The answers to the question regarding the methods teachers use when working with digital technologies, demonstrated that only a small number of teachers use computers for tests, experiment simulation and student research, (i.e. the computer is used as an instrument for information transfer, process mediation, but not as a research or knowledge construction instrument) and that 54 % of arts teachers had never used computers for learning during lessons, (Social Research Laboratory..., p. 43). The students' answers revealed that they devoted least time, as compared with other subjects, to using computers and internet for preparation of their music lessons (2.5% and 5.07%,) (Social Research Laboratory..., p. 57).

Since 2009, the Education Supply Centre under the Ministry of Education and Science has been running a series of school infrastructure development projects. The aim was to equip 276 secondary schools out of 400 participating in the project with modern educational sets for arts education by February

2011. Several groups of experts prepared samples of sets of modern ICT tools for learning. Participating schools have to choose one or several of them according to their needs related to the number of pupils and classrooms they have.

Music teachers' capabilities have significantly improved as university teacher training programs have included the subject of the use of ICT and musical computer programs in their courses. In the academic year 2009/2010 Lithuanian University of Educational Studies started a specialized Bachelor of Music program: *Modern Music and Computer Technologies*. Having completed this specialized study, the students are equipped with music information technologies skills (related both to hardware and software) and with an awareness of how to use the digital technologies practically within music education. We presume that the new generation of music teacher graduates of the aforementioned study program will provide a new approach to the music education and computer technologies.

Despite all this, the digital divide problem is still present among Lithuanian teachers. The Ministry of Education and Science is attempting to solve this problem by offering free teacher professional development classes on how to use digital technologies in teaching and learning within different subjects. Teachers are trained to be computer music technology tutors and will be able to train other music teachers to use the musical computer tools in the learning process.

The music curriculum includes skills which can be acquired through using computer technologies, e.g. in forms 7-8 (aged 13-14) students have to know and describe the stages of computer software for music. The computer is expected to be used as a tool to create a composition with a clear and simple structure. To compose music, the 9th -10th form students (aged 14-16) have to use computers effectively. It is a requirement of The National Curriculum of Music for Basic education (Education Development Centre, 2008, pp. 1099-1119). Computer use from 1 to 6 forms (7-13 years) is not regulated; it is only recommended, if possibilities are available.

In forms 11 and 12 (upper secondary education, 17-19 years) music is an optional subject. Students are free to take arts education or a technological education area. The arts education area consists of the following eight arts education curricula: art, music, dance, drama, filmmaking, photography, graphic design and computer music technologies. Students can choose one of those subjects. Each school offers as much choice as it can within the arts education curricula depending on the equipment available and teacher qualifications.

In 2007 the Minister of Education and Science approved the Musical Computer Technologies Curriculum for Upper Secondary Education (17-19 years). Its aim is to develop the knowledge of technological devices and means of music expression, be able to apply them in one's creative endeavors with the help of ICT and to analyze and evaluate the use of computer music in cultural life and the everyday environment. The curriculum comprises the following areas of activities: creative musical expression and handling of ICT tools, music understanding and evaluation as well as musical computer technologies in the socio-cultural environment. According to the number of issued upper secondary maturity certificates, for example, in 2009 the Musical Computer Technologies Curriculum was completed by 137 school leavers out of about 50,000. By comparison, the Music Curriculum was completed by 11,338 school leavers.

Implementation of Music Computer Technologies Curriculum in Vilnius M. Mažvydas Upper Secondary School (case study). In 2006, Vilnius M. Mažvydas upper secondary school which participated in the project "Increase in opportunities of 14-19 year-old-pupils to choose profile of studies" started the Musical Computer Technologies Curriculum. It is still in its experimental stage at this time. The experience of this school is interesting because it was one of the first schools to implement the Musical Computer Technologies Curriculum. On average this curriculum is chosen by 8 students, out of about 80. Moreover, in 2009-2010 following observation and analysis of teacher work in this school, a group of experts are developing methodological recommendations and a teacher's book. Below we describe this project in terms of background, organization, aims and assessment. We will give an example of different tasks given to students.

The computer technologies music lessons are held in a reasonably well equipped classroom. There are multimedia; synthesizers; electric, semi-acoustic and bass guitars with speakers; percussion instruments; 7 student computers with headphones and music software - Sibelius, Magix Music Maker, Rhythm Maker, Adobe Audition there. All the computers are connected to the Internet. During the first years of work in the classroom the teacher noticed that not all the programs were of interest to students. Moreover, the computers have not been adapted for working with sound. Since it was not possible to record music and following the teacher suggestions, it was decided to buy one external sound card and microphones

from school funds. Within four years of work the teacher noticed that both Music Maker and Sibelius were the most popular types of software for students.

Individual activities dominate in the lesson. As the number of students does not exceed the number of computers, each student works at his/her computer and has a portfolio of his/her works; each student is easy to access, to listen to and to be advised. As each student works at a different pace, those who finish the task earlier can take up another task; therefore, there are no organizational problems. The majority of tasks given to students are creative. If needed, simple learning tasks are given: most of them with the aim of developing students' understanding of composing principles or of their ability to handle the new software. Before the task assignment, samples of other composers' works are discussed in order to have a model to follow. The model is usually found by students, most often from YouTube resources.

Assessment criteria in classroom work are commonly set with student agreement. The main criteria are the following: autonomy, creativity, involvement and meeting the deadline. Before teacher assessment takes place, students self-assess. There are additional criteria if students present their compositions outside the classroom.

The teacher says that computer music lessons are not chosen by the highest attaining music students. Nevertheless, during the learning experience, students became quite active and they are seen to be surprisingly creative. Such students avoid musical performance and academic musical analysis but are eager to create music. The creative process draws them back to academic music work, inspiring their interest in finding new ideas and techniques for use in their own compositions. Some computer music technology students even chose their career connected to information technologies.

The teacher sees obvious benefits of using computers in the music education process. Firstly, it offers the possibility of giving students individual tasks which are given to less motivated or ill-disciplined student, often solving discipline problems. Secondly, the students who are not ready for the lesson are given information search, material preparation, or creation of a musical etude in a "fast way" tasks. If some students are bored but do not interfere with the work of the class, the teacher also gives creative computer tasks which can cover several lessons. The teacher uses the Multimedia projector quite often—to view musical compositions, to present the main lesson ideas, to assess the task performance by peers when the assessment table is being filled in. The teacher says, "I cannot imagine a music lesson without computers".

During the four year period experience of working with the students according to the Musical Computer Technologies Curriculum, the M. Mažvydas school teacher notes that each class was very different. The first generation of students mainly worked with *Sibelius*, then with the accompaniment project; later they created dance music, natural ambient music and a soundtrack for a mute film. Only one student from the first cohort could play a musical instrument.

The second cohort consisted of students who could play the guitar. The classroom activities took place regularly in two ways: half of the group worked on the computer, while the other half played electric instruments. This group was more motivated to create for musical instruments; the computer technologies were used to write down notes or to make recordings.

The third cohort preferred also acoustic music. This group of five students worked like a rock band—they created songs, improvisations and instrumental pieces, which were written down in notes using *Sibelius* software. Students also worked with music re-making and compilation of different pieces of music.

The fourth cohort are very much computer fanatics since computers are the main tool to work in the virtual space of Music Maker midi system.

The methodology of teaching and learning Computer Music Technologies seems appropriate to the interests of 17-19 year old students. It starts with creative tasks, oriented towards awareness of how to self-express musically within small compositions and how to use certain IT tools, and develops into complex, artistic, result-oriented creative tasks.

The work of the teacher was based on her personal experience and initiative, a willingness to work with new technologies and pedagogical intuition. The group of experts who develop methodological recommendations and teacher's handbook are aiming to summarize and systematize the experience of this teacher and prepare coherent and purposeful computer music technology learning methods that will help music teachers to integrate digital technologies in music education process.

The impact of both climate change and digital technologies on art subject teachers' activity is constantly increasing and has become particular aspect of curriculum exchange. Along with curriculum content there are great changes in interrelations among teachers and students. When creating music by

digital technologies or discussing and drawing pictures connected with possible after-effect of climate changes, the atmosphere of partnership between teacher and student has become habitual matter of communication in lessons of art and music. The creatively and purposefully oriented curriculum increases opportunities for learning each from others and is becoming significant phenomenon of contemporary educational process which is able to some extent consolidate educative community.

Conclusions

1. As the threat of climate change in one way or another is manifested in all spheres where there is life, it is expedient that the contents of artistic education should systematically cover all the spheres of the surrounding natural environment: atmosphere, hydrosphere, lithosphere, cryosphere and biosphere, which would form an overall image of the climatically-changing natural world.
2. The research of the teachers' and students' value-based attitude towards the effects of climate changes revealed that they feel certain dismay about all the five spheres; however, the teachers expressed larger concern in comparison to the students. The teachers' and students' value-based orientation regarding biosphere and cryosphere differs inconsiderable; whereas in terms of lithosphere, hydrosphere and especially atmosphere the teachers' apprehension is much bigger than the students'. The respondents maintain that among the five nature spheres climate changes would mostly affect the atmosphere (evaluated by almost four points), whereas the least impact would be on the lithosphere (the solid part of the globe).
3. The impact of human activity on climate changes seems more ominous for both the teachers and the students comparing it to other forms of threats. Astronomic, geo-physical and internal climate alterations are less emphasized. Despite the fact that the negative impact by humans on climate change seems most threatening for the respondents, it is purposeful to maintain a systematic approach of artistic attitudes towards all the determinant factors of climate change in the educational process.
4. We have discussed how the first, but nevertheless secure, steps have been taken in introducing technology into music education in Lithuania. At a national level, digital aesthetics is understood as a means of consolidating creative pedagogy where every interested student will be able to try out creating music her/himself and become acquainted with new sound technology careers; many educators feel that it will enrich musical education and will gain great student interest.
5. Through the introduction of the Musical Computer Technologies Curriculum for 11 and 12 formers, students have been offered opportunities to create music and become digital pioneers and creative. This curriculum brings students and teachers closer. The Vilnius M. Mažvydas secondary school has demonstrated that the teacher can learn from their students if they work in synergy. Great results can be achieved when teachers work in partnership with the students and are not afraid to ask about some aspect of digital technologies. The creatively oriented curriculum appears to meet the needs of 21st century learners, offering opportunities for multitasking, problem solving, trial and error learning, logical thinking, and peer to peer learning.

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KLIMATO KAITOS IR SKAITMENINIŲ TECHNOLOGIJŲ RAIDOS IŠŠŪKIAI MENO DALYKŲ PEDAGOGAMS

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Santrauka

Šiuolaikinė visuomenė kelia vis naujus iššūkius mokytojams. Viena vertus, daugėja nerimo dėl galimų klimato kaitos padarinių, kita vertus, nesiliauja didėjęs skaitmeninių technologijų poveikis nūdieniam gyvenimui. Šie iššūkiai verčia ieškoti naujų ugdymo aspektų, galinčių padėti sėkmingiau rengti augančiąją kartą artimesnei atečiai.

Vienokius ar kitokius orų ir klimato kaitos padarinius istorijos bėgse žmonės pastebėdavo nuolat. Daugelis klimato pasikeitimų sukeldavo įvairias stichines nelaimes, dėl kurių kildavo badmečiai, prasidėdavo epidemijos, išsiplėsdavo karai, o kitąkart ištisos tautos imdavo kraustytis į kitas vietas. Orams atšylant paprastai ima didėti kritulių kiekis, o su jais išauga stichinių nelaimių mastai ir skaičius. Tai, kad 2003 metų vasara Alpių regione buvo šilčiausia per pastaruosius 2,5 tūkstančio metų, gali būti signalas, jog žymių pasikeitimų reikia laukti daugiau. Kadangi lemtingi klimato kaitos padariniai stipriai veikia žmonių pasaulėjautą, tokiais momentais suaktyvėja naujų pasaulio raidos vizijų paieška, aktualizuojasi filosofinis, meninis, religinis žmogaus dvasios aktyvumas.

Jau akivaizdu, kad šiuolaikiniai mokiniai prisitaikė prie gyvenimo su naujomis technologijomis, kurios gerokai pakeitė jų mokymosi poreikius ir būdus. Kadangi muzikinis ugdymas savo veiklą įvairove ir kūrybiška prigimtimi reikšmingai prisideda prie šiuolaikiniam žmogui aktualių kompetencijų ugdymo, pasitelkus skaitmenines technologijas šis procesas gali tapti dar efektyvesnis. Mat skaitmeninių technologijų pagalba kurti gali visi to norintys žmonės. O muzikinė patirtis, įgyta kuriant muziką, ypač aktualizuoja kūrybinį mąstymą. Todėl nevalia atsilikti nuo naujų muzikinio ugdymo būdų, dargi atvirkščiai, turėtume būti naujų pokyčių centre ir žengti kartu su skaitmeninės estetikos raida.

Straipsnyje iškeliamas požiūris į klimato kaitą kaip visuotinį reiškinį vaidmuo dailės ugdymo procese, analizuojamos skaitmeninių technologijų atskirties tarp mokinių ir mokytojų sprendimo galimybės, sprendžiamos pedagoginio bendravimo, grindžiamo partnerystės ir mokymosi vienu iš kitų principais, nagrinėjamos skaitmeninių muzikos technologijų programos efektyvesnio įgyvendinimo mokykloje perspektyvos.

Pasikeitimų grėsmę visose žmogų supančios gamtos sferose mokytojams ir mokiniams buvo pasiūlyta įvertinti penkių balų sistema. Atlikta mokytojų ir mokinių vertybinių nuostatų tyrimo analizė parodė, kad labiausiai, jų nuomone, visų penkių gamtos sferų kontekste klimato kaita gali paveikti atmosferą. Šios sferos pasikeitimų galimybė buvo įvertinta bemaž ketvertu. Tuo tarpu mažiausią poveikį klimato kaita, pasak mokinių ir mokytojų, turėtų padaryti litosferai (arba kietajai žemės rutulio daliai). Lyginant mokytojų ir mokinių vertinimus, visų penkių sferų atžvilgiu mokytojai jaučia vis dėlto didesnę nerimą dėl klimato kaitos padarinių nei mokiniai. Biosferos ir kriosferos atžvilgiu mokinių ir mokytojų vertybinis orientavimas skiriasi nežymiai, bet dėl litosferos, hidrosferos ir ypač atmosferos pasikeitimų mokytojų nuogastavimai jau gerokai didesni nei mokinių. Gauti tyrimo duomenys įpareigoja atsižvelgti į pasaulėjautos pakitimus, ugdymo turinį priartinant prie naujai išylančių psichosocialinių ypatumų.

Skaitmeninės technologijos muzikiniame ugdyme Lietuvoje žengia pirmuosius, tačiau sparčius žingsnius. Nacionaliniu lygmeniu šis procesas suprantama visų pirma kaip priemonė kūrybos pedagogikai įtvirtinti. Siekiama, kad tiesiog kiekvienas mokinsys galėtų išbandyti save muzikos kūryboje, susipažinti su naujausiais garso technologijų pasiekimais. Pastebėta, kad skaitmeninės technologijos žymiai paįvairina ir praturtina muzikinį ugdymą, pažadindamos didesnę mokinių susidomėjimą kūrybine veikla. Be to, muzikinis ugdymas veiklą įvairove ir kūrybiška prigimtimi reikšmingai prisideda prie šiuolaikiniam žmogui aktualių įvairių kompetencijų ugdymo.

Muzikinė patirtis, įgyta kuriant muziką, labai išauga, nes mokant kurti garsų meną, vaikams galima pateikti nevienodo sudėtingumo, įvairios stilstikos bei skirtingo ekspresyvumo užduotis. Skaitmeninės technologijos muzikiniame ugdymui ypač reikšmingos, kadangi kiekvienam mokiniui suteikiama galimybė išbandyti jėgas muzikos kūrybos srityje.

Sparti skaitmeninių technologijų kaita kuria situacijas, kuomet kai kurių naujovių mokosi ne tik mokiniai vienas iš kito, bet ir mokytojai iš mokinių. Toks partnerystės principas tampa svarbiu, abipusiškumo dvasia grindžiamu nūdienės pedagogikos reiškiniu, vienijančiu ir stiprinančiu švietimo bendruomenę.

Dėstoma teorinė medžiaga iliustruojama empirinio tyrimo rezultatais, gautais aiškinantis dailės mokytojų ir 9-12 klasių mokinių vertybines nuostatas klimato kaitos atžvilgiu bei skaitmeninės atskirties tarp mokytojų ir mokinių sprendimo ir mokinių kūrybiškumo ugdymo dirbant su skaitmeninėmis technologijomis tobulinimo galimybes.